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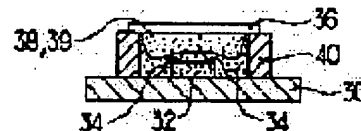
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(54) RESIN SEALING METHOD OF CCD MODULE**(57)Abstract:**

PURPOSE: To obtain a resin sealing method in which, when a cover glass is arranged on a resin sealing frame and a resin sealing is performed in order to sufficiently protect and cover a CCD chip as a whole, air bubbles are removed smoothly from a sealing resin and by which the generation of a crack is prevented surely in the resin and in the cover glass.

CONSTITUTION: In the resin sealing method of a CCD module, a CCD chip 32 is placed on an insulating substrate 30, a resin sealing frame 40 is arranged so as to surround the CCD chip 32 and a cover glass 36 which protects and covers the light-receiving face of the CCD chip 32 is resin-sealed on the resin sealing frame via a transparent resin 38. In the resin sealing method, the transparent resin 38 is filled into the resin sealing frame so as to coat the inside of the sealing frame and the CCD chip 32, air bubbles are removed under a heating condition, and the resin is cured temporarily. Then, a transparent resin 39 is supplemented to the upper part of the temporarily cured resin, air bubbles are removed under a heating condition, the cover glass 36 is then placed on the upper part of the resin, and the resin is cured.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] It is related with the resin-seal technique of CCD module which this invention requires for CCD (charge-coupled device) module, especially carries out the resin seal of the cover glass to the light-receiving side of CCD chip.

[0002]

[Description of the Prior Art] In order to protect the light-receiving side of the CCD chip 12 after mounting the CCD chip 12 on the ceramic substrate 10 in which the necessary circuit pattern was formed and making flow connection for between this CCD chip 12 and the ceramic substrates 10 by wire bonding 14 as it faces manufacturing CCD module conventionally and it is shown in the drawing 5 and the drawing 6, closure fixation of the cover glass 16 is carried out through the transparent resin 18 at the light-receiving side side.

[0003] However, in order to perform a resin seal smoothly in this case, the guard ring 20 as a resin-seal frame constituted from glass epoxy etc. is arranged so that the aforementioned CCD chip 12 may be surrounded on the ceramic substrate 10, and the aforementioned cover glass 16 is laid on this guard ring 20.

[0004] However, although what was constituted so that the aforementioned whole guard ring 20 might generally be covered is used for this cover glass 16 and silicone (silicone resin) is used as a resin for closure 18, the foam is generated so much at the time of hardening of the aforementioned resin, it becomes difficult for these foam to pile up and remove to the internal surface of parietal bone of cover glass 16, and presence of these foam serves as failure to the light-receiving side of the CCD chip 12.

[0005] For this reason, the device which enabled it to carry out a degassing more easily than the fraction which exposed the foam generated to the resin for closure with saving of the material of cover glass 16 in the open air is also made, for example by making the dimension of cover glass 16 into the minimum size required in order to protect the light-receiving side of the CCD chip 12.

[0006]

[Problem(s) to be Solved by the Invention] However, when silicone sinks into the die bond agent for the resin-seal frame which are the thing which air is mixing in silicone, and the guard ring 20 as a cause which the foam generates so much as a resin for closure mentioned above in case of hardening of the silicone to use, or the wire bonding 14, it can consider that the foam is generated from the aforementioned closure frame or a die bond agent. Moreover, silicone will be hardened, before the foam has fallen out, since a cure rate is quick. For this reason, there are difficulties, like the occurrence frequency of the defective which cannot tie a proper image in the CCD chip 12 as a CCD module becomes high.

[0007] Then, it is to offer the resin-seal technique of CCD module which can prevent certainly occurrence of the crack in a resin and cover glass while it is faced arranging cover glass on a resin-seal frame, and performing a resin seal and attains elimination of the foam from the resin for closure smoothly, in order that the purpose of this invention may fully carry out the protective covering of the whole CCD chip.

[0008]

[Means for Solving the Problem] In order to attain the aforementioned purpose, the resin-seal technique of CCD module concerning this invention While CCD chip is laid on an insulating substrate, a resin-seal frame is arranged so that this CCD chip may be surrounded. In the resin-seal technique of CCD module which comes to carry out the resin seal of the cover glass which carries out the protective covering of the light-receiving side of the aforementioned CCD chip on this resin-seal frame through a transparent resin As a transparent resin is coated, while it is filled up with it to the aforementioned closure within the limit side and CCD chip in within the limit [resin-seal] While the upper part of the resin which was made to perform and carry out temporary hardening of the degassing, and subsequently carried out temporary hardening under the heating condition is supplemented with a transparent resin, it is characterized by performing a degassing to the bottom of a heating condition, laying cover glass in the upper part of the account resin of back to front, and stiffening the aforementioned resin.

[0009] In this case, in within the limit [resin-seal], while it is filled up with a transparent resin to level lower than the top of the aforementioned closure frame While the supplement injection of the transparent resin is carried out to the level of the top of the aforementioned closure frame to the upper part of the resin which was made to perform and carry out temporary hardening of the degassing in about 50-70 degrees C, and subsequently carried out temporary hardening A degassing can be performed in about 50-70 degrees C, and the resin seal of CCD module can be performed by laying cover glass in the upper part of the account resin of back to front, and stiffening the aforementioned resin.

[0010]

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[Function] As a transparent resin is coated, while it is filled up with it to the aforementioned closure within the limit side and CCD chip in within the limit [resin-seal] according to the resin-seal technique of CCD module concerning this invention While the upper part of the resin which was made to perform and carry out temporary hardening of the degassing, and subsequently carried out temporary hardening under the heating condition is supplemented with a transparent resin While cellular elimination of a resin can be smoothly attained by performing a degassing to the bottom of a heating condition, and making the upper part of the account resin of back to front harden an installation ***** resin for cover glass The thermal contraction after hardening of a resin can be permitted enough, and occurrence of the crack in a transparent resin and cover glass can be prevented certainly.

[0011]

[Example] Next, it explains to a detail below, referring to an accompanying drawing about the example of the resin-seal technique of CCD module concerning this invention.

[0012] The drawing 1 or the drawing 3 is an outline cross section in which showing one example of the resin-seal technique of CCD module concerning this invention, and showing a resin-seal process, respectively. Namely, the insulating substrate which a reference mark 30 becomes from a ceramics etc. in the drawing 1 or the drawing 3 , Wire bonding for 32 making CCD chip and 34 making flow connection of between the aforementioned CCD chip 32 and the ceramic substrates 30, The cover glass formed in the light-receiving side side in order that 36 may protect the light-receiving side of the aforementioned CCD chip 32, The transparent resin for 38 and 39 carrying out closure fixation of the aforementioned cover glass 36 in the top of the CCD chip 32 and 40 show the guard ring which it comes to constitute from glass epoxy arranged so that the aforementioned CCD chip 32 may be surrounded on the aforementioned ceramic substrate 30, respectively.

[0013] However, in this invention, in within the limit [of the guard ring 40 which forms a resin-seal frame], as shown in drawing 1 , it is level lower than the top of the aforementioned closure frame about the transparent resins 38, such as silicone, and it is filled up the first stage so that the internal surface of parietal bone and the CCD chip 32 of the aforementioned closure frame can be coated, and a degassing is carried out to the bottom of an about 50-70-degree C heating condition. Thus, after performing a degassing enough, at about 120-150 degrees C, it holds for about 10 - 30 minutes, and temporary hardening of the resin 38 is carried out. Subsequently, as shown in drawing 2 , to the upper part of the resin 38 which carried out temporary hardening, the supplement injection of the transparent resins 39, such as silicone, is carried out to the level of the top of the aforementioned closure frame, and a degassing is carried out to the bottom of an about 50-70-degree C heating condition. Then, cover glass 36 is laid in the upper part of the aforementioned resin 39, and the aforementioned resin 39 is stiffened by holding at about 150 degrees C for about 1 to 4 hours (refer to the drawing 3).

[0014] Thus, as shown in drawing 4 , while cellular elimination of a resin can be smoothly attained by constituting according to the resin-seal technique in this example, the thermal contraction after hardening of a resin can be permitted enough, and occurrence of the crack in the transparent resins 38 and 39 and cover glass 36 can be prevented certainly.

[0015] As mentioned above, although the suitable example of this invention was explained, this invention can carry out many design changes within limits which do not deviate from the pneuma of this invention, without being limited to the aforementioned example.

[0016]

[Effect of the Invention] While CCD chip is laid on an insulating substrate according to the resin-seal technique of CCD module concerning this invention so that clearly from the example mentioned above In the resin-seal technique of CCD module which comes to carry out the resin seal of the cover glass which arranges a resin-seal frame so that this CCD chip may be surrounded, and carries out the protective covering of the light-receiving side of the aforementioned CCD chip on this resin-seal frame through a transparent resin In within the limit [resin-seal], as the aforementioned closure within the limit side and CCD chip are coated with opposite **, while they are filled up with it, a transparent resin While the upper part of the resin which was made to perform and carry out temporary hardening of the degassing, and subsequently carried out temporary hardening under the heating condition is supplemented with a transparent resin While cellular elimination of a resin can be attained compulsorily and smoothly by performing a degassing to the bottom of a heating condition, laying cover glass in the upper part of the account resin of back to front, and stiffening the aforementioned resin The thermal contraction after hardening of a resin can be permitted enough, and occurrence of the crack in a transparent resin and cover glass can be prevented certainly.

[0017] Especially the effect that according to the closure structure of CCD module by this invention is an easy configuration, moreover attains elimination of the foam certainly, reduces the incidence rate of a defective, and is contributed to the enhancement in the productivity of this seed CCD module is very large.

[Translation done.]

